PACE®

Pace, Inc.

TF-350

— OPERATION MANUAL —

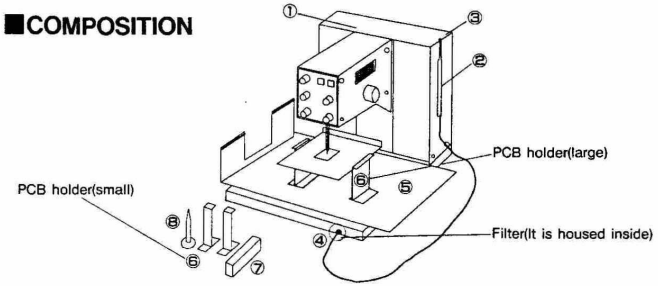
■INTRODUCTION

Thank you for your purchasing the TF-350 SMD rework station.
As you are aware, the technical innovation enabled the LSI highly densified and minimized in its shape, and the latest technology is now needed for the handling of the LSI.
Meanwhile, the surface mount works also are required to keep the high reliability because 0.65mm of the QFP pitch is further minimized to 0.5 mm, and recently the fine pitch of 0.3 mm has been developed in the industry.
The TF-350 is a highly reliable SMD rewok system with hot air style that is applied for the removal and the soldering of many shapes of QFP/SOP/PLCC/BGA/PGA and etc. When the solder face of the SMD is melted in a brief time by the hot air blowing from the nozzle that circles right over the solder face, the SMD can be removed quickly by the vacuum tweezers. Also, it can be utilized for the soldering too.
When it is overheated due to the stop of air flow, the thermal protector will be activated to put off the heater, so that the safety guard can be double cheched and enhanced. It will be automatically restored when the ambient temperature is lowered to 60°C

■MAIN FUNCTION

1. The circle range of the nozzle can be adjusted to any dimension up to 50 mm in X axis(right & left) and Y axis(back & forth).So it can be utilized for any size of SMD up to 50mm.
2. One(1) mode can be selected from the four(4) of STANDARD, LOW, PGA/BGA, SLOW to acconmodate to each of the application.
3. The heater temperature is variable.
4. In the repeated works, it is convenient that the timer can be set at will for the nozzle to come up automatically at the pre-set time.
5. The operation can be stopped any time by pushing the button of STOP.
   The nozzle will come up by pushing the button of STOP and the heater will be automatically put off. But the air flow will continue for approx. 20 seconds to cool down the nozzle then the air pump will stop.
6. The vacuum tweezers is equipped to quickly remove the SMD at the solder melting.
7. The PCB can be handled up to 420 mm in length and no limitation in width.

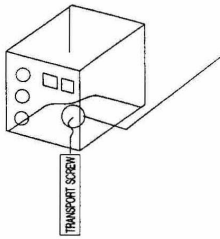
■COMPOSITION



Composition of Main body and Accessories

①Main body	⑥PCB Holder
②Vacuum Tweezers	2 pcs. of small size
③Suction cup for Vacuum tweezers(3 pcs.)	2 pcs. of large size
④Filter for Vacuum tweezers(5 pcs.)	⑦Base Plate Stand
⑤Base Plate 430 mm X 300 mm	⑧PCB Support Pin

PLEASE REMOVE A TRANSPORT SCREW PRIOR TO CONNECTING THE POWER CORD.



A butterfly screw is fitted to protect the nozzle against vibration in the transport. Please remove it prior to connecting the power cord.

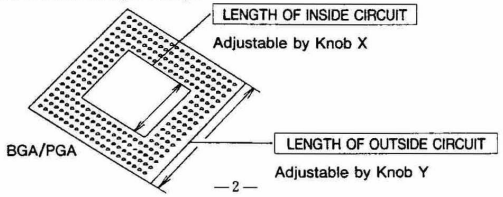
Be sure to fit it in again at re-packing when it is transported. Set X and Y mode to 0 and turn left Knob Z to the maximum, then push the Start button to get Nozzle in the lowest position and switch off the power.

■INSTALLATION／COMMISSIONING

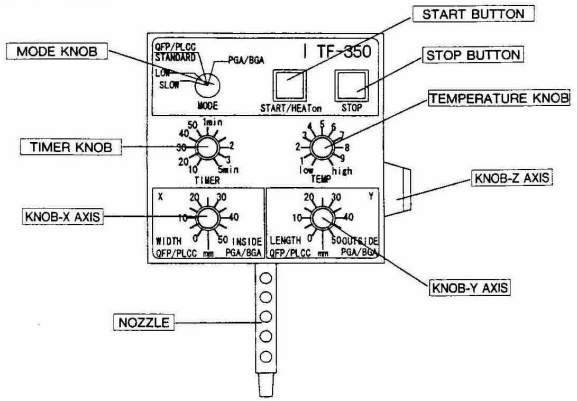
1. Place the TF-350 on a level surface
2. Before connecting Power cord, please confirm that Transport Screw is removed. Transport Screw with butterfly shape is fitted to fasten the arm inside the front panel.Nozzle is supported by the arm.
3. Connect Power cord and Vacuum tweezers
   Power source voltage: AC 120 V ±10 % or AC 220 V ±10 %

Power cord:	CEE standard	UL standard
Plug	S122	E35611
Connector	S477	E35797
Cord	S52	E35611

4. confirm each of the basic operation as stated below.
   1) At Power Switch "on", Main body will be in waiting situation.
      Set Mode Knob in STANDARD and push Start button to lower Nozzle. Then confirm whether or not Nozzle can be raised and lowered by Knob Z. Also confirm the convertion of dimension X(right & left) and Y(back & forth) by Knod X and Knob Y.
      Confirm that Heater goes on when Start button is pushed again.
      Also confirm whether or not the brightness of Heater can be changed by Temperature Knob.
   2) After pushing Stop button, set Mode Knob in LOW. And push Start button twice. Then confirm whether or not the air flow is less than the Mode of STANDARD.
   3) After pushing Stop button, set Mode Knob in PGA/BGA. And push Start button twice. The function of Knob X and Knob Y in Mode PGA/BGA will be different from the Mode of STANDARD/LOW/SLOW. Confirm the convertion of dimension X(inside circuit)and Y(outside circuit)by Knob X and Knob Y as illustrated below.
   4) After pushing Stop button, set Mode Knob in SLOW. And push Start button twice.
      Confirm that the air flow in the Mode of SLOW is less than the Mode of STANDARD.
      also confirm that the Nozzle moving speed is much slower (approx 1／10) than the mode of STANDARD.
   5) Heater is fitted for use of the original voltage. When it is used in different voltage, the original Heater shall be replaced to meet the right voltage.



■CONTROL PANEL



■PRESTART

1. Turn on the power switch
2. Turn right(clockwise) Knob Z to the maximum to raise the nozzle to the highest position.
3. Set Timer Knob at max. of 5 min.
4. Set Temperature Knob in "high" position
5. Set Mode Knob in STANDARD
6. Place a PCB on the PCB holders and adjust Base Plate so that the removing QFP can be positioned right under Nozzle.

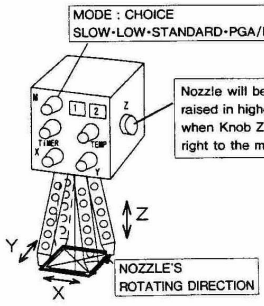
■TEST-RUN (POSITION SETTING)

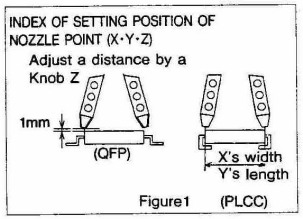
7. Push START button one time to lower Nozzle
8. Turn left(counterclockwise) Knob Z to lower Nozzle so that Nozzle point can be 1 mm above the surface of QFP.
9. Decide the width X and length Y by Knob X and Knob Y so that Nozzle can circle right over the solder face of QEP.
10. Check 6, 8 and 9 above again if needed to get the right position setting.

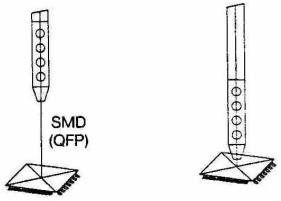
■START-REMOVAL WORKS

11. Push START button once more to switch on the heater. And the air flow will start melting the solder face.
12. The vacuum tweezers will be usable while the air blow is on.
13. You can see the solder glitter and start melting.
14. At the solder melted, place a finger on the hole of the tweezers and let the tweezers suck the surface of QFP.
15. Be sure to push STOP button. Nozzle will be raised up and Heater will be off. In 20 seconds, the air pump will be automatically stopped with Nozzle cooled down.
16. When you want to heat Nozzle again, push START button agein.

■REMOVAL METHOD IN "STANDARD" MODE







STEP 1

This removal method is illustrated in "STANDARD" Mode
Turn right Timer Knob to the maximum when Timer is not in use.

STEP 2

When the button of 1 (green color) is pushed one time, Nozzle will be lowered. Adjust up & down by Knob Z.

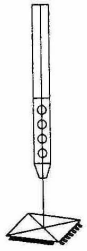
STEP 3

TEST RUN (POSITON SETTING)

In order to circle over the circumference of QFP, Nozzle point can be set by placing a PCB with slight movement of Base Plate and by deciding X's width (right & left) and Y's length (back & forth) that is shown in Figure1

START

When the button of 1 is pushed once more, the hot air will start blowing.

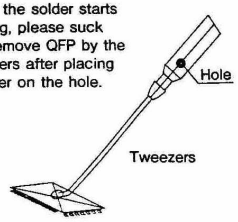


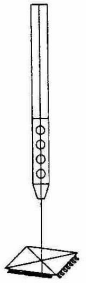
STEP 4

When the setting time of Timer is due, Nozzle will be automatically raised up. When Timer is not in use, Nozzle will be raised up by pushing button of 2

STEP 5

When the solder starts melting, please suck and remove QFP by the tweezers after placing a finger on the hole.





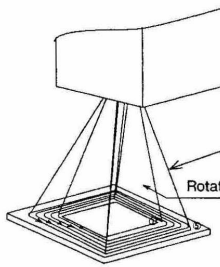
STEP 6

In approx. 20 seconds, the pump will be automatically stopped with Nozzle cooled down.

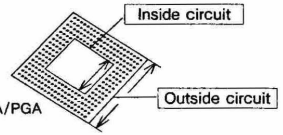
■MODE SELECTION & APPLICATION

MODE	AIR FLOW	NOZZLE MOVE	APPLICATION	INDEX OF HEATER SETTING
STANDARD	12 L/MIN.	FAST	REMOVAL FOR QFP/PLCC/SOP/ SOP	TEMP.
LOW	6 L/MIN.	FAST	REMOVAL FOR QFP/PLCC/SOP *RECOMMENDABLE FOR DENSE PCB WITH THE SMALL COMPONENTS.	*AT THE POSITION OF 'HIGH', MOST PROPER TEMPERATURE IS AVAILABLE FOR REMOVAL. HOWEVER, YOU CAN LOWER THE TEMPERATURE AT WILL IF NECESSARY. *AT SOLDERING, IT IS ADVISABLE TO ACTIVATE AT CALIBRATION OF 3 TO 5
PGA BGA	12 L/MIN.	FAST	REMOVAL & SOLDERING FOR PGA/BGA	
SLOW	6 L/MIN.	SLOW *1/10 OF FAST	SOLDERING	

■REMOVAL OF BGA/PGA



BGA/PGA



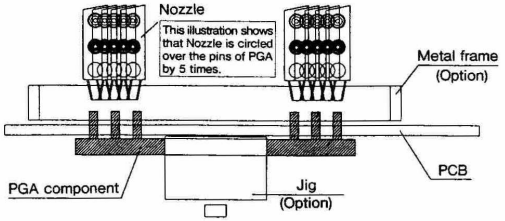
Nozzle

Rotating direction of Nozzle

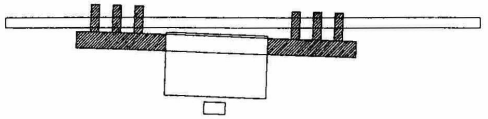
One(1) cycle composes of five(5) circuits with starting at ① and ending at ⑤. The cycle will be repeated.

REMOVAL METHOD OF PGA IN "PGA/BGA" MODE

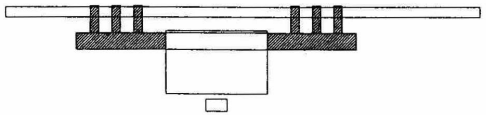
STEP 1 – Set Mode Knob in "PGA/BGA".



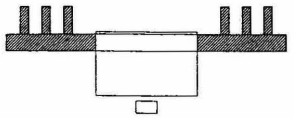
STEP 2 – Seeing the solder melting, push down the reverse side of PCB evenly by the metal tweezers or others so that the pins points are on the level of the reverse face of PCB.



STEP 3 – When the pins points were down to the level of the reverse face of PCB, please pull it down evenly by the jig.

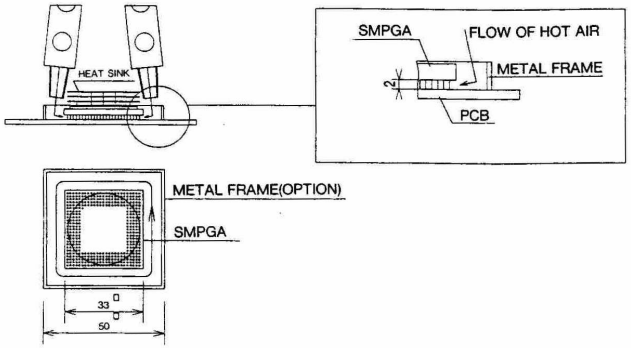


STEP 4 – The PGA will be removed.



Metal frame and Jig are optional parts.

REMOVAL OF SMPGA (WITH HEAT SINK) IN "STANDARD" MODE



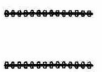
REMOVAL OF SMPGA WITH A ROUND SHAPED HEAT SINK

1. Set Mode Knob in "STANDARD"
2. Place a square Metal frame with the side dimension of 50 mm around SMPGA.
3. The tip of Nozzle is to be below the top of Heat sink as illustrated above.
   Push Start button and tentatively set the tip end of Nozzle in a position so that the rotation of "X" and "Y" can be larger than the diameter of Heat sink.
   And place PCB on the PCB holders not to hit the tip end of Nozzle.
4. Adjust the width of "X" and "Y" so that the tip end of Nozzle can rotate between the circumference of SMPGA and Metal frame as illustrated above.
5. After the position setting, push Start button again.
6. With the hot air flowing into the pins from the clearance of the bottom face of SMPGA and PCB, the solder will start melting.

REFLOW METHOD OF QFP IN "SLOW" MODE

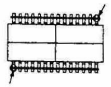
STEP 1
Remove a SMD in "STANDARD" or "SLOW" mode

STEP 2
Completely remove the solder remained on the face of pattern by SC-7000 to clean the face.

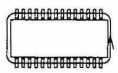


STEP 3
Place cream by a dispenser or others.

STEP 4
Put a new SMD on the pattern and position it accurately.



STEP 5
Fix the two points tentatively by a solder iron as illustrated above.
(Use a finger to push the SMD lightly so that it can not float)



2 circuits in mode of "SLOW"

STEP 6
Solder it in mode of "SLOW".

REMARKS
At Step 2, if the solder remained on the pattern is comparatively new and usable, it is advisable to re-use the remained solder and to flatten it by a solder iron. In this case, place a little of flux on the pattern, then accurately position a new SMD on the pattern while the flux is wet (before the flux is dried).
The flux will be hardened when it is dried. When re-using the remained solder, please do Step 5& 6 after Step 2.

KEY ADVICE ON OPERATION

1. When Nozzle happens to contact the SMD, it is likely to come up and to be in the waiting situation. In this case, please push Start button again for Nozzle to come down.
2. When removing the small BGA & QFP less than 15mm, it is advisable to set the nozzle to the maximum height.
3. The vacuum tweezers is designed to be used like a pen. Please hold it like a pen for more easier usage.
4. When the solder is oxidized, more attention should be paid because the solder melting is hard to identify.
5. There will be quite a difference in the time required for removal in the first operation (The heater is cool at start) and in the second after (The heater is already warm). Please pay attention to that.
6. When PCB is bent or warped due to the large size, please put the PCB support pin underneath the SMD. When it is bent upward, please adjust the height of Nozzle by Knob Z not to hit the bent PCB.
7. Remove the SMD by the metal twizzers when it is bonded.
8. When the small components like 1005 are mounted around the removing SMD, please use Mode "LOW". However, if you find that the heating volume of Mode "LOW" is in shortage, please use Mode "STANDARD" after seperating the nearby parts by putting the metal frame or the masking tape.
9. When the PCB holders are unusable because of connectors on PCB, please use the PCB support pin.
10. Since the ceramic board is weak for heating impact, it is better to put the board on an Aluminum plate of 1mm thick.
11. In the reworking of PBGA (Plastic BGA), it is advisable to activate the Temperature Knob at calibration of 3 to 4.
12. For the removal of the large sized SMD more than 30mm, an option of the metal frame will be more useful.

13. For the removal of PGA & DIP, more efficient works will be done when the molded side is preheated at 120°C.
14. If the connecter is made with heat-plasticity, it is not easy to remove it without melting or damaging it. However TF-350 can do it well while it is impossible with other equipment.
15. In handling the flexible PCB or the film board, please put it on another board where there is no mounted parts. Then, proceed the works on it.
16. Do not rely on the timer so much. It sometimes will cause failure in continuous works.
17. The removal time varies according to the conditions.
    i.e.: continuous or intermittent works, the size of SMD and the sorts of board.
    Please pay attention to the timer setting.
18. The small PCB is apt to move itself. It will be easy to do the works when you put a weight on the small PCB.
19. Do not turn Mode Knob in the operation. If the Mode is changed in the operation, it is possible that Nozzle makes a false movement because the last Mode program is memorized in the computer. When you wish to change Mode, be sure to push Stop button to return to the starting position then select a Mode you want.

■SPECIFICATIONS

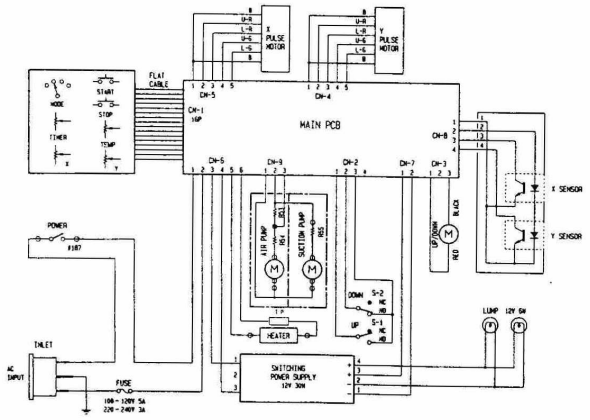
STYLE	HOT AIR STYLE. BLOWING NOZZLE : 350W ϕ 4mm
AIRFLOW RATE	(LOW • SLOW) 6 LITER/MIN. (STD. PGA/BGA) 12 LITER/MIN.
AIR PUMP • VACUUM PUMP	BUILT-IN
NOZZLE TRACE RANGE	(X • Y) 0~50mm (Z) 25mm
TEMPERATURE CONTROL	ADJUSTABLE BY KNOB ON PANEL
TIMER CONTROL	ADJUSTABLE BY KNOB ON PANEL : MAX. 5 MIN.
SIZE OF BOARD TO PROCESS	(LENGTH Y) 420mm (WIDTH X) NO LIMIT
MODE	(4 MODES) STD • LOW • SLOW • PGA/BGA
POWER/ELECTRICITY	AC 100,120,220V /360W
DIMENSIONS	W 300mm H 310mm D 450mm
WEIGHT	9 KGS

■REPLACEMENT PARTS FOR MAINTENANCE

TF 350 spare parts

PART NUMBER	DESCRIPTION
6010-0118-P1	TF 350 Heater Assy 120V
1360-0272-P1	TF 350 Metal Frame, 11 pcs.
1338-0101-P1	Air Pump for 100-120V
1338-0102-P1	Suction Pump for 100-120V
4008-0034-P1	Power Supply PCB for 100-120V
6020-0139-P1	PCB Main for 100-120V
1309-0055-P1	Filter (10 pcs/set)
1334-0029-P1	Air Motor for Blowing 100-240V
1334-0030-P1	Air Motor for Suction 100-240V
1285-0039-P1	PCB Control for 100-120V
1121-0827	Micro Vacuum Nozzle

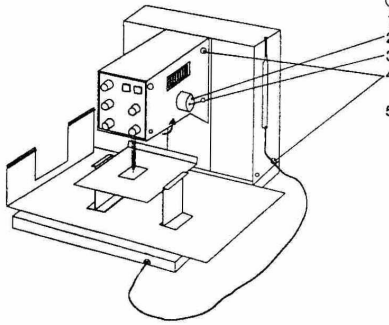
■BLOCK DIAGRAM



■MAINTENANCE

The TF-350 is basically designed for the maintenance free.
However, the replacement of major parts will be needed when the emergency accident or trouble happened.
And the consumable parts will have to be changed from time to time when required.
Please follow the instructon stated below when the parts replacement is needed.

A:INSTRUCTION TO REPLACE MAJOR PARTS



①REMOVAL OF COVER PLATE

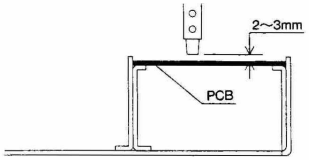
1. Switch off the power.
2. Pull out the small cover for Knob Z.
3. Come off the vis in the knob.
4. Come off all of 14 pcs of screw for fitting the cover plate.
5. When removing the top cover of front panel, slightly open outward the under side then pull it upward.

②REPLACEMENT OF HEATER(NOZZLE)

1. Disconnect the AC cord
2. Remove the top cover of the front panel
3. Pull the connector out of heater lead wire
4. Loosen the bolt which fastens the tube and the heater.
5. Take the heater out of the tube.
6. Insert the new heater in the tube.
7. fasten the bolt fixing the tube and the heater so that the clearance between Nozzle tip and the PCB surface can be 2-3 mm as illustrated below.

REMARKS

The new thermal protector will be supplied with the new heater.



③REPLACEMENT OF AIR MOTOR(PUMP)

Disconnect the AC cord.

Remove Cover plate to access Air motors(Pumps)

A) Air motor(M1) for pressure side

1. Pull 2 pcs of Motor lead wire (red color) out of Connectors on PCB(PCB/# SD-2000M) of pressure side
2. Pull 2 pcs of Air tube out of Motor
3. Disconnect Earth wire out of Motor by loosenning the vis.
4. Come off 4 pcs of Screw of Pump base
5. Pull off Insulator.
6. Replace the old motor with a new one.

B) Air motor (M2)for suction side

1. Pull 2 pcs of Motor lead wire (red color) out of Connectors on PCB(PCB/# SD-2000M) of suction side
2. Pull 1 pc of Air tube out of Motor
3. to 6. Same as A)

④REPLACEMENT OF MAIN PCB(PCB/# SD-2000A MAIN)

Disconnect the AC cord

Remove Cover plate to access Main PCB

1. Pull off all of Connectors
2. Pull off the fitting materials(white color) of Main PCB
3. Pull out Main PCB to replace with a new one.

B:INSTRUCTION TO REPLACE CONSUMABLES

①CHANGE OF FILTER

Suction filter is housed inside Base frame. After coming off Hose joint by Wrench, take the old filter outside to replace with the new one.

②CHANGE OF LAMP

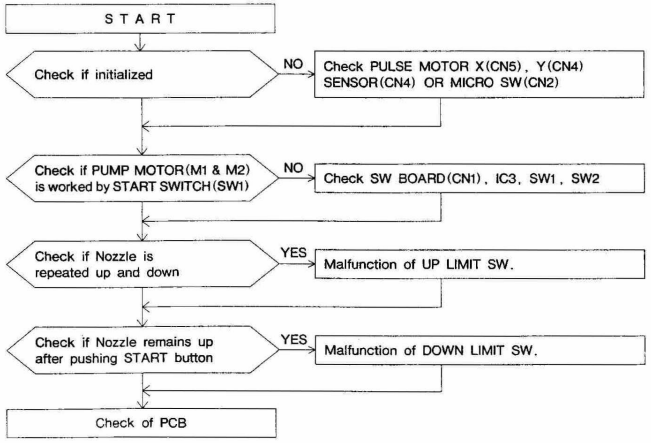
Lamp is a push-off type. To take it off, push it upward and turn it clockwise.

③CHANGE OF PAD FOR VACUUM TWEEZERS

It is a rubber-make. When injured or collapsed, it should be replaced with a new one.

■TROUBLE SHOOTING

The trouble shooting illustrated below is an index so that you can quickly identify the cause of trouble and restore the equipment to normal operation. If the trouble would not be settled, please contact Service Div. of DEN-ON or the service agent for further technical information on the repairs.


START
Check if initialized
NO
Check PULSE MOTOR X(CN5), Y(CN4) SENSOR(CN4) OR MICRO SW(CN2)
Check if PUMP MOTOR(M1 & M2) is worked by START SWITCH(SW1)
NO
Check SW BOARD(CN1), IC3, SW1, SW2
Check if Nozzle is repeated up and down
YES
Malfunction of UP LIMIT SW.
Check if Nozzle remains up after pushing START button
YES
Malfunction of DOWN LIMIT SW.
Check of PCB

CAUTION

The TF-350 is manufacturerd and sold for the purpose of use in factory, laboratory and industrial business. It is designed for the solder to melt efficiently with hot air. Since the nozzle gets high in temperature, you must not touch it before its cooling down. And since the removed SMD is still high in temperature, you must not touch it for certain time after the removal.
The TF-350 will not stop for approx. 20 seconds while the nozzle is cooled down by the air pump even if the stop button is pushed. In the meantime you must not turn off the power switch. Otherwise, it will cause accident due to overheating.

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